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THE LOUISIANA CERTIFIED SEED CONFERENCE

Those concerned with the certification of seed potatoes have long appreciated that there are many important problems associated with this very important phase of potato growing. Certain of these are as important to the consumer as they are to the producer of certified seed potatoes. It has long been recognized that these difficulties could best be adjusted by a conference of representatives from both producing and consuming states.

With this purpose in mind, a conference has been called at the Louisiana State University, Baton Rouge, on the 6th and 7th of April, 1938. This is to be a joint conference of horticulturists, plant pathologists, and representatives from the regulatory boards from the various states interested in seed potato use or production. It is hoped that an agreement may be reached concerning a uniform system of certification, as well as definite regulations regarding the movement of seed potatoes.

The conference will also consider certain disease problems associated with the certification of seed potatoes. Particular attention will be given to the so-called spindle or hair sprout disease which has recently caused serious concern to the southern potato grower.

This conference has been arranged in conjunction with the exercises to be held in connection with the dedication of the new Agricultural Center and other new buildings at the University. It is anticipated that many well-known agriculturists, in addition to those directly concerned with the certification of seed potatoes, will be present. It has been announced by Julian C. Miller that an opportunity will be afforded to examine the various field plots on the 5th of April, the day before the meeting. This should be an important meeting to the potato industry and as many as possible who are interested in seed potatoes should attend. Every one will be welcomed by those associated with Louisiana State University.

POTATO PROGRAMS NOW IN OPERATION

A. E. MERCKER^{1, 2}

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Wide fluctuations in production have brought about alternate periods of very high and very low retail prices for potatoes. Low income workers, in particular, have suffered from the high price periods for one of their most important food items. Incomes of potato growers have neither been satisfactory nor dependable. In 1937, growers increased their potato acreage by approximately 4 per cent to a total of nearly 3,177,000 acres. This acreage, with an average yield of about 123.1 bushels to the acre, the second largest yield on record, resulted in a production of roughly 391,000,000 bushels, exceeded during the past ten years only in 1928 and in 1934. This production is 59,000,000 bushels more than was produced in 1936 and 19,000,000 bushels more than the 1928-1932 average crops.

When the supply of late potatoes is as large as it was last season, farm prices usually reach a seasonal low point in October and remain about that level or show but a slight rise during most of the remaining portion of the season. A crop of the size harvested in 1937 would, on the basis of past relationships between supplies and prices, result in a farm price of approximately 65 cents a bushel, for the entire United States and about 60 cents a bushel for the thirty late states. This compares with the 10-year (1919-1928) average United States farm price of nearly \$1.11. The parity price for potatoes is about 90 cents for the United States and about 83 cents a bushel in the thirty late states. Prices paid to producers in the commercial producing areas in the late surplus states are depressed much more than the prices paid to producers in the less intensive producing areas or to producers near consuming markets.

PROGRAMS ESTABLISHED TO MEET THE SITUATION

Without some coordinating influence potato growers will continue to receive undependable and unsatisfactory incomes. On the

¹In charge of Potato Programs, Agricultural Adjustment Administration.

²Paper presented at the 24th annual meeting of the Potato Association of America in session at the Washington Hotel, Indianapolis, Indiana., Dec. 28, to Dec. 29, 1937.

recommendation of the representatives of the potato industry attending the vegetable conference July 15-July 17, 1937, at Washington, D. C., the Administration was requested to use the existing facilities of the Government to alleviate the prospective low potato price situation and to prevent the recurrence of such distressing situations. It was requested that the Administration prepare and make operative a program to divert the lower grades of the surplus of the 1937 crop of potatoes into by-products, feed and other uses and that a program of this nature should be supported by marketing agreement programs and purchases for the needy on relief.

MARKETING AGREEMENTS

Marketing agreements were proposed for important shipping areas where potato production is concentrated and from which major quantities are shipped across state lines. By having each agreement and order apply geographically as originally proposed a sufficient volume of potatoes shipped into the tributary marketing territory will be controlled to affect the price in such areas and thereby increase the income to potato producers operating in the area covered by the agreement and order. These agreements were prepared for four areas and orders were made effective on the 19th of October 1937 for the states of Michigan, Wisconsin, Minnesota and the major producing counties of North Dakota, Colorado, Nebraska, Wyoming and the southern part of Idaho. The order was rejected in the fourth area by the Maine producers.

These orders prohibit the interstate shipment of cull potatoes which are defined as potatoes which are less than $1\frac{1}{2}$ inches in diameter and grading less than U. S. No. 2. They further provide that, upon the recommendation of the control committees, the Secretary may institute further limitations on the interstate shipments of other low quality or small sized potatoes. The Idaho control committee recommended the prohibition of the interstate shipment of all potatoes less than 2 inches in diameter. This was made effective on the 13th of November, 1937. The Colorado, Nebraska and Wyoming control committee recommended that potatoes not meeting the requirements of the U. S. commercial grade and of a size less than $1\frac{7}{8}$ inches in diameter be prohibited from interstate shipment. This recommendation was approved by the Secretary and made effective on the 6th of December. A recommendation to prohibit the interstate shipment of

potatoes grading U. S. No. 2 from the Michigan, Wisconsin, Minnesota and North Dakota areas was made by the committee and is now under consideration. In these areas producers are trying to help themselves by withholding the lower grades and sizes from the markets. The incomes of potato producers in all the commercial areas would be greatly enhanced if supporting programs would be adopted.

FEED DIVERSION PROGRAM

To supplement the potato orders in the three areas where marketing orders are in effect, a program for the diversion of 10,000,000 bushels of potatoes into livestock feed was made effective. Under this program payments will be made to potato growers who divert or sell potatoes for diversion into livestock feed of a grade equal to, or better than, U. S. No. 2 and not less than $1\frac{1}{2}$ inches in diameter. Applications totaling over 7,900,000 bushels from more than 12,000 growers have already been received and it is estimated that the total will be applied for shortly. In addition, about 1,500,000 bushels are held in reserve for future applications from growers in these states. Quantities applied for by the states are as follows: Idaho, 3,500,000 bushels; Colorado, 1,500,000 bushels; Michigan, 800,000 bushels; Wisconsin, 750,000 bushels; Minnesota, 700,000 bushels; North Dakota, 300,000 bushels; Nebraska, 250,000 bushels, and Wyoming, 100,000 bushels.

The potatoes must be diverted within three months after the diversion authorization is issued. In order to receive the payment of 15 cents a bushel or 25 cents per hundredweight for the diversion, the grower must submit a certificate of compliance within four months after the diversion authorization is issued. Before the potatoes are diverted they must be graded and weighed or measured by a Federal State inspector or local field representatives. The diversion of potatoes into livestock feed is practical.

INDUSTRIAL POTATO STARCH DIVERSION

To further meet the situation a program to encourage the diversion of surplus potatoes grading U. S. No. 2, or better, into industrial starch is now operating. Under this program the manufacturer will be authorized to divert certain quantities of potatoes meeting the required grade specification for which he will be paid 24 cents for 100 pounds, or 40 cents a barrel. Diversions authorized must be com-

pleted within two months after the authorization is issued. When the authorization amount is exhausted the manufacturer may apply for further authorizations as long as they are available. Arrangements are made whereby the manufacturer will remit to the grower, without any deductions, the value of the payment received from the program. It is probable that the factories in Maine can be kept operating for the remainder of the season under this program. Seven factories in Maine are now participating in this program and have agreed to pay growers 20 cents a barrel for U. S. No. 2 potatoes, making a total payment to the grower of 60 cents a barrel for potatoes of this grade so diverted.

EDIBLE POTATO STARCH AND FLOUR

Another program provides that the Federal Surplus Commodities Corporation purchase potato flour or starch manufactured from potatoes grading U. S. No. 2, or better. The price at which the starch is purchased will take into consideration that the company making the sale will pay the growers a designated price per hundredweight for potatoes grading U. S. No. 2, or better, used in the manufacture of the product. Under this program the Federal Surplus Commodities Corporation can also purchase potatoes grading U. S. No. 2, or better, and have mills manufacture them into starch or flour. The flour or starch that is purchased by the Corporation, together with recipes for its use, will be distributed to the needy on relief. In this way it is hoped that consumption of these products will be greatly increased. Several companies are interested in this program.

SURPLUS POTATO PURCHASE PROGRAM

Purchases of potatoes are being made by the Federal Surplus Commodities Corporation. Large quantities were purchased and removed from the regular commercial channels and were efficiently distributed to those on relief. This program has been very helpful to growers and shippers since the purchases removed part of the surplus, and in this way prevented prices from dropping to disastrous levels. About 2,600,000 bushels, or 4,536 car loads, were purchased in 18 states and 2 terminal markets from the 17th of June through the 26th of December 1937. This is approximately 4.3 (four and three-tenths) per cent of the 104,783 cars shipped during this period. The quality purchased is primarily U. S. No. 1 grade. A few purchases

were made of potatoes grading U. S. Commercial or U. S. No. 2, $1\frac{7}{8}$ inches minimum diameter. Buying started in Oklahoma and North Carolina, Virginia, California, and has continued through most of the intermediate and late potato shipping states. The major purpose of this purchase program is to relieve particularly distressing surplus situations by removing the excess supply. The distribution of these commodities is secondary to the major purpose of relieving the acute agricultural situation resulting from the excess production.

With the majority of commercial growers and shippers in the major late potato producing areas actively cooperating in these programs by withholding cull potatoes and other low grades from entering interstate markets, by purchases for relief distribution and diversion to feed, starch and flour it is likely that the 19,000,000 bushel surplus of late crop potatoes will be removed in the near future.

1938 AGRICULTURAL CONSERVATION PROGRAM

The Agricultural Conservation Program provides for acreage goals for farm crops to establish the proper relation between the soil-conserving and soil-depleting crop acreage. In a referendum conducted at the end of September 1937 commercial potato growers voted 5 to 1 in favor of a potato acreage goal. The national goal for potato acreage in 1938 is between 3,100,000 and 3,300,000 acres. The average acreage for the 10-year period 1928-1937 was 3,346,000 acres. The national goal will be apportioned among states, counties, and individual farmers on the basis of past production, modified by production facilities, soil conservation requirements and acreage trends. They will be established in commercial areas for farms raising three or more acres of potatoes. Payments will be based on the annual normal yield of potatoes for the individual farm. For the early states the rate which is subject to change probably will be 4 cents a bushel in the early states and 3 cents a bushel in the late states. Deductions for exceeding the goal will be set at the rate of 40 cents a bushel for early potatoes and 30 cents for late potatoes, on a normal yield to the acre for each acre in excess of the goal.

Participation in these programs is entirely voluntary. Starting with these programs it is hoped that the industry will continue its co-operation by developing additional programs. Much can be done by united action on the part of the industry. We are always glad to extend such cooperation as is feasible and practical, and will always welcome suggestions.

POTATO SPRAYING IN EASTERN VIRGINIA IN 1937

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Potato spraying experiments were conducted in several widely separated localities (Onley, Norfolk, Back Bay, and Kiptopeke, Virginia) in 1937 in an effort to compare the value of spraying potatoes with calcium arsenate-Bordeaux (2-4-6-50) when potato flea-beetles *Epitrix cucumeris* Harris, and potato leafhoppers *Empoasca fabae* Harris are present, and when absent. Colorado potato beetles *Lepidotarsa decemlineata* Say, were controlled in the check plats by spraying with calcium arsenate (2-50). Previous experiments showed that calcium arsenate partially controls flea-beetles, and has no effect on leafhoppers.

Potato flea-beetles were very abundant at Onley and practically absent at the other three localities. Potato leafhoppers became abundant at Onley and Norfolk about two weeks before harvest. There were also many leafhoppers at Back Bay, but they appeared just a short time before the potatoes were harvested and apparently did not affect the yield.

Potato diseases were not a factor in these experiments as they were practically absent.

Traction and gasoline engine power sprayers that maintained pressures from 150 to 300 pounds were used in these tests. All sprayers covered four rows at a time and all of them had three nozzles to the row with the exception of the sprayer used at Back Bay which had two nozzles. Four applications were made at Norfolk and at Kiptopeke and five applications at Onley and Back Bay. Yield records were taken on two rows 100 feet long, replicated nine times at Kiptopeke and twelve times at Back Bay; at Norfolk on three rows 175 feet long replicated thirteen times; and at Onley four rows 140 feet long replicated fifteen times.

As shown by the results given in table 1, significant increases in yield were obtained at Onley where flea-beetles and leafhoppers were abundant and at Norfolk where leafhoppers were abundant, whereas the differences in yield were not significant at Back Bay and Kiptopeke where flea-beetles and leafhoppers were absent or scarce.

From these data and from field observations it appeared that the increase in yield at Onley was largely caused by potato flea-beetle control. The flea-beetle foliage injury at Onley was determined by counting the number of holes where the beetles had fed on seventy-five leaflets selected at random from the treated plats, and seventy-five from the check plats. These counts revealed an average of 54.9 holes to the square inch of leaf surface in the untreated as compared with 3.8 holes in the treated plats (a difference of 2.8 holes may be considered significant).

The increase at Norfolk may not have been caused entirely by leaf-hopper control as the Colorado potato beetles were not adequately controlled on the untreated plats early in the season.

TABLE I.—*Results of spraying potatoes in 1937 with a calcium arsenate-Bordeaux (2-4-6-50) mixture, under different intensities of potato flea-beetle and potato leafhopper infestations*

Locality	Infestation		Yield in Bushels of U. S. No. 1 Potatoes to the Acre		Bushels Increase	
	Potato Flea-beetle	Potato Leafhopper	Untreated	Treated	Over Untreated	Necessary to Be Significant
Onley	Heavy*	Medium to Heavy	170	222	52	11
Norfolk	None	Medium	118	143	25	15
Back Bay	None	Light	202	210	8	30
Kiptopeke	None	None	114	107	-7	11

*Counts of flea-beetle feeding places or holes at Onley showed an average of 54.9 holes to the square inch of leaf surface on the untreated plants, and 3.8 holes on the treated plants (a difference of 2.8 holes may be considered significant).

In experiments conducted at Norfolk in 1936 when potato flea-beetles and potato leafhoppers were absent, calcium arsenate-Bordeaux sprayed plats did not result in significant differences in yield when compared with untreated plats. However, at New Church, Virginia where potato flea-beetles were moderately abundant, an average increase of 32 bushels of U. S. No. 1 potatoes to the acre was obtained (1), (2).

The results in 1936 and 1937 agree with the results of similar

experiments at New Church in 1932, 1933, 1934, and 1935 in that the increases in yield of potatoes caused by the treatments were directly proportional to the potato flea-beetle population (1), (2), (3), (4).

These results agree with those reported by Zimmerley in 1928(5). He states that no benefits were obtained by the use of Bordeaux sprays or copper lime dusts, when diseases and insects are not present to an injurious extent.

CONCLUSIONS

As shown by these results spraying potatoes with a calcium arsenate-Bordeaux mixture gave significant increases in yield when potato flea-beetles or potato leafhoppers were present in injurious numbers, and did not give significant differences in yield when these pests were not present to an injurious extent.

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IMMEDIATE GERMINATION OF CERTAIN SELFED AND HYBRID POTATO SEED¹

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In potato breeding work one of the problems is to obtain satisfactory germination from the seed available. Quite often, especially in recently harvested seed, the germination is very slow and irregular, at times requiring several months to complete germination. Stcherbacheva (2) reported irregular germination in new potato seeds and pointed out that length and condition of storage influenced the germination. Stier and Cordner (5) find that "the germination response of new seeds at different temperatures is slightly different from that of year old seed." Stevenson and Milstead (3) report that old seeds germinate better than new seeds. In 1936 Stier (4) found that in certain samples of seed, a period of one hundred and thirty days or more was required for complete germination when planted thirty days after harvesting whereas the same lot of seed one year later completed germination within twenty to thirty-five days.

During the progress of potato breeding work at Minnesota, it has been noted that more satisfactory germination is obtained from one year old seed than from recently harvested seed i.e., if samples of recently harvested seed are planted and samples from the same general lot are planted one year later, more satisfactory germination is obtained from the later planting. In certain samples of seed, however, germination is as good at the time of harvest as at later periods. In this paper data are presented to show that different lots of potato seed vary in amount of delayed germination and that in certain lots, delayed germination is not exhibited at all.

DATA ON THE GERMINATION OF BREEDING MATERIAL

In 1937 data were taken on the germination of twenty-two lots of potato seed planted approximately one week after being removed from the seed ball. This seed was planted in soil at a uniform depth and spaced to permit a fairly accurate determination of the number of seeds that germinated. The temperature and moisture conditions

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TABLE 1.—*Variation in time required for germination between and within twenty-two lots of seed planted immediately after harvest, expressed in per cent of total germination obtained.*

Seed-Lot Number	No. of Seeds Germinated	Per Cent of Total Germination			
		By Transplanting Time (Approx. 30 Days)	31 to 46 Days	47 to 68 Days	69 to 90 Days
11.37	50	84.00	16.00	0.00	0.00
111.37	66	93.94	3.03	1.52	1.50
112.37	184	79.89	10.86	5.97	3.60
113.37	121	76.85	12.39	4.96	5.80
114.37	15	80.00	20.00	00.00	0.00
118.37	40	62.50	22.50	12.50	2.50
95.37	165	98.18	1.21	0.61	0.00
96.37	246	97.56	2.44	0.00	0.00
97.37	161	87.58	10.56	0.62	1.30
99.37	120	95.83	4.17	0.00	0.00
100.37	99	89.90	5.05	1.01	4.00
101.37	119	86.55	10.08	0.84	2.50
102.37	206	96.60	2.91	0.00	0.50
103.37	230	97.83	1.74	0.00	0.50
105.37	453	83.88	11.04	2.65	2.40
106.37	102	81.37	13.72	4.90	0.00
167.37	25	68.00	16.00	16.00	0.00
162.37	198	97.47	2.53	0.00	0.00
145.37	332	96.69	0.30	0.00	0.00
149.37	354	96.89	2.54	0.00	0.60
151.37	151	98.67	1.32	0.00	0.00
5-4-1	28	100.00	0.00	0.00	0.00

were controlled. Germination counts were made at transplanting time, on the 40th day, the 68th day, and on the 90th day. The results of this study are given in table 1, where the germination is expressed in per cent of the number of seeds that germinated. In several lots of seed, germination was complete, or nearly complete by transplanting time, although in other lots of seed more than 30 per cent of the viable seed had not germinated. It will be noted that in several cases, germination continued up to the 90th day.

A total of eighty-two lots, including both selfed and hybrid seed that was one year or more old, was also grown in the greenhouse in 1937. Considerable delayed germination was noted in this old seed, and also in certain species crosses.

IMMEDIATE GERMINATION OF THE SEED OF A SELFED LINE

In the fall of 1935, a large quantity of seed balls from a selfed line was obtained. These were divided on the basis of the maturity of the balls into two lots—ripe and slightly green. The seed was removed immediately and the first planting was made on the day the seed was removed. Plantings were then made at varying time intervals over a period of two and one-half years. The seeds were then germinated in soil under controlled temperature and moisture conditions in the greenhouse. In order to determine if the time from harvest to planting significantly influenced the germination of these seeds, the data were classified for analysis into five age intervals as follows: Interval 1, seed stored less than 1 week; interval 2, 2 to 8 weeks; 3, 9 to 20 weeks; 4, 21 to 48 weeks; and 5, 49 to 120 weeks.

An analysis of variance indicated that there was a slightly greater difference in germination between intervals than within intervals. This difference, although small, was significant for both ripe and slightly green seed. The mean germination in per cent for each age interval, the difference necessary for significance, and the mean germination in per cent for the entire two and one-half years are given in table 2. It will be noted that in this case the old seed did not germinate any more readily than recently harvested seed. In fact, the best germination was obtained in the first interval for both ripe and green seed.

The quickness and uniformity of germination were taken into consideration in the study, the coefficient of velocity as employed by Kotowski (1) was used to compare the variation in germination between intervals.

TABLE 2.—*The effect of time from harvest upon the germination of a sample of selfed potato seed as indicated by per cent germination.*

Condition of Seed	Mean Per Cent Germination					Significant Difference	Mean Per Cent Germination
	Interval 1	Interval 2	Interval 3	Interval 4	Interval 5		
Ripe seed	88.5	78.4	77.4	78.6	78.7	5.4	80.8
Slightly green seed	64.0	45.3	37.3	40.0	39.0	13.7	44.5

COEFFICIENT OF VELOCITY

$$\text{Coefficient of Velocity} = \frac{100 A_1 + A_2 \dots \dots A_x}{A_1 T_1 + A_2 T_2 \dots \dots A_x T_x}$$

A = the number of seedlings selected.

T = the number of days after planting corresponding to A.

By referring to table 3, it will be seen that the value of the coefficient varies only slightly from interval to interval, indicating uniformity in regard to the time required for complete germination of all viable seeds. Kotowski (1) states that practically the coefficient is limited within two and fifty and, as may be seen by an examination of the formula, the magnitude of the coefficient increases as the time required for germination decreases. If we compare the coefficients obtained with those obtained by other workers (1), (4), (5), for potato seed and for vegetable seeds in general, it is found that the coefficients obtained are relatively large for seed when germinated in soil, which indicates rather rapid germination. In fact, in most cases the germination was complete by the tenth day and in many cases germination was practically complete by the eighth day.

CONCLUSIONS

A study of twenty-two genetically different samples of recently

harvested seed showed marked differences in the degree of delayed germination exhibited, some samples completing germination before transplanting time whereas other samples required approximately ninety days to complete germination. Observations indicate that the old seed when planted may exhibit delayed germination.

TABLE 3.—*The effect of time from harvest upon the germination of a sample of selfed potato seed as indicated by the quickness and uniformity of germination.*

Condition of Seed	Coefficient of Velocity of Germination					Average
	Interval 1	Interval 2	Interval 3	Interval 4	Interval 5	
Ripe seed	16.2	15.9	15.9	16.4	16.4	16.12
Slightly green seed	14.9	14.8	13.8	16.4	15.6	14.95

All potato seed do not exhibit delayed germination. One particular lot of selfed seed showed no delayed germination over a period of 2½ years.

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FURTHER OBSERVATIONS ON "BLUE STEM" OF POTATO

C. R. ORTON AND L. M. HILL

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In a previous publication (1) we have described the general symptoms of blue stem. This paper points out comparisons with other diseases which may be confused with blue stem and reports observations and field experiments not previously recorded.

A comparison of the symptoms of blue stem with other potato diseases reveals a number of interesting differences as well as similarities. The first stages of blue stem are evidenced by an upward folding of the terminal leaflets accompanied by a yellowing or purpling of the margins and is suggestive of primary leaf-roll in certain varieties of potato. There is also a similar shortening of the internodes. In blue stem the disease does not appear until after blooming and then progresses rapidly with vascular and cortical necrosis in the stems, stolons, tubers, and roots, followed by wilting and death, usually within ten days. (See fig. 1, A and B).

The dendritic necrosis in the stolon end of tubers affected with blue stem is suggestive of net-necrosis. However, it visibly extends to less than one-third of the longitudinal diameter of the tuber, whereas in net-necrosis it is generally visible throughout.

The pronounced browning of the vascular elements throughout the plant in the case of blue stem is suggestive of the symptoms produced by such vascular parasites as *Bacterium solanacearum*, *Fusarium spp.* and *Verticillium*. The most outstanding difference is the distribution of the necrosis in the tubers. The necrosis associated with vascular parasites is almost exclusively confined to the vascular "ring", whereas in blue stem the pith and cortex also become streaked with necrosis. In blue stem the necrotic tissues are brown, never blackish as is the case when affected with *Verticillium* and some species of *Fusarium*.

Many attempts have been made to isolate a pathogene from plants

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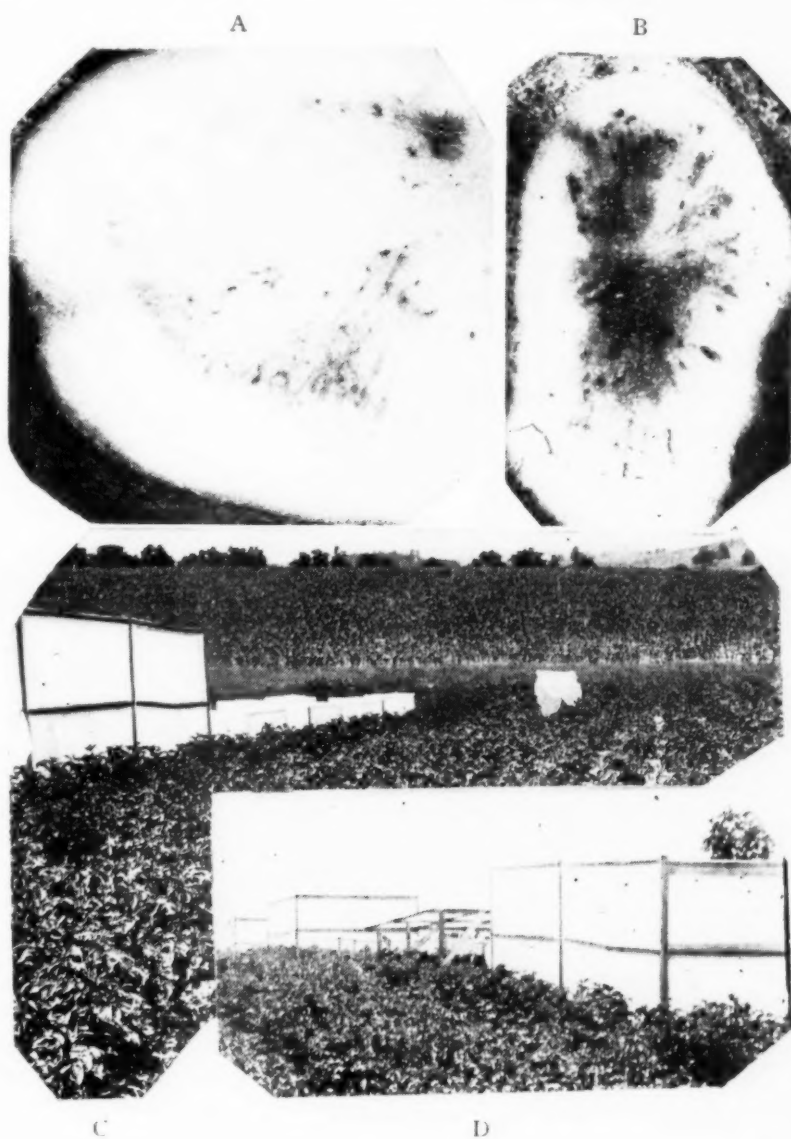


FIGURE I

- A, Transverse section cut one-fourth of the length of tuber from stolon attachment showing blue stem necrosis in vascular and fundamental tissue.
B, Transverse section cut through point of stolon attachment showing necrosis in blue stem.
C, Showing wall No. 3 of Figure II and caging experiment.
D, Showing walling and shading experiment in which the structures are numbered from left to right in same order as they appear in Figure II.

affected with blue stem. Plantings from all portions of diseased plants have failed to yield consistent results. The occasional bacteria and fungi which have been isolated have not proved to be pathogenic. Extensive microscopic studies of diseased plants have failed to reveal any identifiable organism. We are convinced that blue stem is not a bacterial or fungous disease.

Although blue stem resembles psyllid yellows with respect to transmission in that it appears to be initiated by some insect and further by the fact that the disease is not transmitted through the tuber, there appear to be few symptoms in common. Vascular necrosis has not been reported in psyllid yellows.

Observations made in 1936 revealed that blue stem was distributed widely throughout the Appalachian Plateau in West Virginia. In August 1937 a trip was made through Pennsylvania, crossing northern New Jersey and the Hudson River into New York and thence northward through northwestern Connecticut, western Massachusetts, and to north-central Vermont. From this point we proceeded by Burlington to Port Kent, thence westward through the Adirondacks to Batavia, New York. Two days were spent in the potato districts of western New York and we then proceeded to Coudersport, Pa., in the heart of the largest seed-producing section of that state. On this trip a trace of blue stem was found in a field near Natural Bridge, New York, and in another field near Perry, New York. Otherwise the disease was not seen outside of Pennsylvania and West Virginia although it is present in western Maryland. The most severe cases were found in central Pennsylvania, where one farmer suffered a total loss of his crop. Apparently this disease does not occur in serious proportions outside of Pennsylvania, western Maryland, and West Virginia. No observations have been made in other states bordering West Virginia.

The economic importance of blue stem has been under observation for several years. It has been increasing gradually since its first recognition. Although the disease may be found in practically every commercial field or garden throughout the area of general distribution, it is much more severe in certain areas. An average infection ranging from 10-15 per cent may rise to 90 per cent or more in some fields, and no healthy plants were found in two of the fields which were visited in 1937. One of these fields was in a pasture in which no cultivated crop had been grown for many years previously.

Another important economic factor has been in evidence since blue stem has become prevalent. Throughout the chief areas of distribution

of the disease, the housewife has seriously objected to the use of local potatoes because of the tuber necrosis. This situation has become so important that in many markets it is difficult to sell locally-produced table stock. At the same time fancy prices are being paid for introduced table stock.

Field experiments in 1936 clearly indicated that blue stem was probably associated with some insect for the following reasons: 1. It first appears in the border rows or hills of the field and spreads rather evenly and uniformly toward the center. 2. In rare cases did the disease appear in potato plants which were protected by muslin cages from most insects except those which travel through the soil.

The experiments of the same year also indicated that the disease was not transmitted through the tubers. Diseased tubers collected the previous year and planted in the greenhouses as well as in the open field did not produce blue stem in any greater percentage than did seed collected from healthy hills and planted under the same conditions. Furthermore, tubers from diseased hills planted under muslin cages invariably produced apparently healthy plants, even though adjacent hills not protected by muslin contracted the disease.

These results led to a more elaborate series of field tests at Arthurdale in 1937 which involved the planting on the 18th and 19th of May of Russet Rurals from certified New York stock, together with Russet Rurals harvested the previous season from blue stem hills.

Through the center of the fields a series of muslin protections were constructed on the 23d of June according to the accompanying diagram. (See fig. I, C and D). Three muslin walls 6 feet high by 15 feet long by 12 feet wide, open at the top, were built to cover four rows of approximately 12 hills in each row. (See fig. II). Two of the rows were from certified seed and two were from diseased seed. One similar block of 48 plants was shaded with muslin at a distance of 4 feet from the ground. (See fig. II). In this case no side walls were provided. In addition 18 cubical cages of 30-inch dimension were placed each, on the 25th of June over 2 or 3 hills in adjacent rows planted with diseased and healthy tubers. (See fig. I, C). Thereby nine diseased and nine healthy groups were established.

The results of the 3 walling experiments show that considerable protection was afforded in this manner. Inside of Wall No. 1 the average infection was 10.7 per cent while adjoining plants in the same rows outside the walls showed 39.6 per cent blue stem. Within Wall No. 2 the average infection was 6.8 per cent, whereas outside it was 33.3 per cent. In Wall No. 3 the infection was 3.4 per cent, although

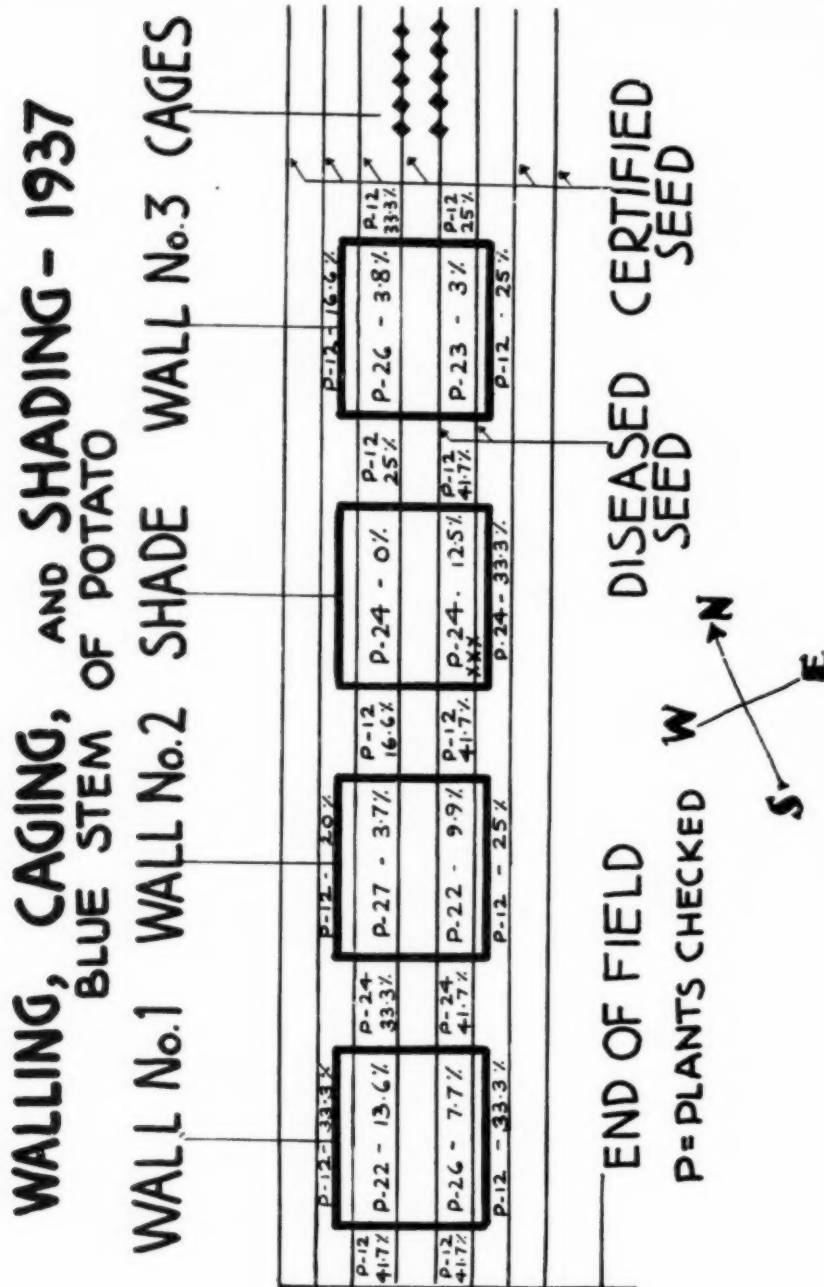


FIGURE II

Diagram of walling, shading, and caging experiments showing percentage of infection of blue stem in and on outside of the walls. The small crosses under the shade show location of plants infected with blue stem. These plants in this row were exposed to more sunlight than remaining plants under the shade.

outside it was 31.25 per cent. Comparing the infection in rows from healthy seed with the amount of infection in rows grown from diseased seed inside the muslin walls, it was found that 7.0 per cent disease occurred in rows from healthy seed whereas 6.9 per cent disease occurred in the diseased seed. A similar relationship exists between the percentages of blue stem in adjacent unprotected rows grown from healthy *versus* diseased seed.

The results of the single experiment under muslin shade are comparable with those within the muslin walls. The average infection outside was 31.25 per cent whereas under the muslin it was 6.25.

Under the 18 small cages only one diseased plant appeared, and it was produced from certified seed. The same results were obtained in 1936 from 32 cages. None of the insects caged in 1936 and 1937 produced any aerial symptoms of blue stem.

An adjacent portion of the same field was sprayed six times with 8-8-100 Bordeaux plus 4 pounds of calcium arsenate at approximately 10-day intervals beginning the 23d of June. Unsprayed rows were left for checks. At harvest time on the 1st of September the average weight of tubers on each healthy hill in the sprayed rows was 1.64 pounds, whereas the average weight of tubers on each healthy hill in the unsprayed rows was 1 pound. The average weight of tubers on the diseased hills in sprayed rows was .63 pounds, whereas the average weight of tubers on each diseased hill in the unsprayed rows was .43 pounds. It is evident that spraying did not decrease the percentage of disease in the field but that it increased the yield of tubers in diseased hills in approximately the same rates that it increased the yield in the healthy hills. These results may be accounted for largely by the prevalence of late blight, which appeared in the field late in the season.

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SECTIONAL NOTES

ARKANSAS

Most of the Irish potatoes in this immediate section have been planted. The better growers are using certified seed from Nebraska and other states. Approximately 8 bushels of seed are being used to the acre, and from 600 to 1000 pounds of commercial fertilizer, equivalent to a 5-10-5 mixture.

Some of the growers are planting in six-foot rows, using a normal rate of seeding and row fertilization. These growers expect to plant corn, cotton or some other cash crop in the middles within a month or six weeks. (Mar. 7).—G. W. WARE.

CALIFORNIA

In the Edison-Magunden-Arvin section all the potatoes are planted. Some late plantings are emerging through the ground. The earlier plantings show an excellent stand with the vines almost touching between the rows. This section has planted about 7,500 acres. We will probably start harvesting about the 10th of April. The growers in this area will continue to harvest until probably the 20th of May.

About three-fourths of the acreage in the Shafter-Wasco area have been planted. The rainy weather has delayed planting in this area to a certain extent. The total anticipated acreage is still unchanged, which ranges from 25,000 to 26,000 acres. The estimated yield for the Shafter-Wasco area will be approximately 280 one-hundred pound sacks to the acre. The Edison-Magunden-Arvin section, which is harvested before the potatoes are as large, will yield from 200 to 225 one-hundred pound sacks to each acre.

We still anticipate that the peak shipment will be reached sometime during the first or second week in June. This peak of shipments will depend, of course, largely upon the price at harvest time.

Considerable rain has been falling during the past two weeks but has done no damage that can be observed at this time, other than to cause a portion of the crop to be planted at a later date. (Mar. 9).—M. A. LINDSAY.

The most significant development that has happened to the Early California Potato Crops, is the recent extremely heavy rains which have affected the entire state.

The rains were so intense that considerable damage occurred in the potato plantings in Kern County, where water stood on a number of fields.

Some estimates have been made that the loss to the production in Kern County may readily reach 25 per cent. However, our latest survey indicates approximately 10 per cent in Edison which is the Early District and possibly about 15 per cent in Shafter.

The acreage in the Edison District is approximately 8,000 and in the remainder of Kern County, comprising Shafter, Wasco, etc., approximately 20,000 acres.

Except for these heavy rains, growing conditions in Kern County have been favorable.

The condition of the seed potatoes, generally speaking, was good and crops gave a good stand as is customary in the Shafter District.

With reference to Potato Control, there was a meeting held in Stockton on the 7th of March, which was attended by Potato Growers from San Joaquin County. The object of this meeting was to get the views of the various growers in this District regarding a Potato Program—their expression as to what form of program would be most feasible. At that meeting Mr. Frank Lyons was also appointed as delegate for this District, to go to the Washington Meeting, which is to be held during the middle of this month.

The growers of Delta potatoes, expressed themselves as agreeable to any Federal regulation that would restrict acreage or the quantity of potatoes moving to market, providing that all potato producing districts are incorporated in the plan. The growers are absolutely against any restriction of Stockton potatoes that would not restrict the movement of Washington, Oregon or Idaho potatoes into this area.

The local delegate has been instructed to report all suggested plans made at the Washington Meeting so that the Stockton Delta growers may vote on them.

With reference to the acreage on the Delta adjacent to Stockton, the figure at this writing is approximately 9500 acres compared with 10,500 last year.

Although Southern California bore the brunt of the recent deluge, according to latest reports, the potato acreages scattered over Southern California were not appreciably damaged.

A telegram which was received from Ft. Smith, Arkansas stated that "Arkansas, Oklahoma will show at least 25 per cent reduction commercial acreage from last year." (Mar. 10).—E. MARX.

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LOUISIANA

The commercial potato plantings in this section began in early January and were about completed by the 5th of February. Both the planting and the growing conditions have been ideal to date.

The crop in the earlier districts of Terrebonne and Lafourche parishes is showing a good stand except for small areas in lots of seed showing spindling or hair sprouts. The spindling sprout condition occurring in northern seed has caused considerable concern. Laboratory tests and field observations show that some lots of northern seed reveal 5 to 50 per cent in this condition.

The potato crop, at the present time, is a week to ten days in advance of the normal crop. Barring frost injury, Louisiana should start shipping potatoes north between the 10th and 15th of April.

The Louisiana Potato Association is now canvassing the field to determine the sentiment of growers relative to the proposed marketing agreement for southern states including Louisiana. It is generally believed that it will be too late to set up the agreement in time to be a benefit to Louisiana growers this year. (Mar. 14).—J. G. RICHARD.

MISSISSIPPI

The indicated acreage of commercial Irish potatoes in 1938 for Mississippi was given by the Bureau of Agricultural Economics as 4900 acres. This is about 1600 acres less than the 1937 acreage. This indicated acreage, however, according to all the information I have received in the state, is too high, and the indications are that the acreage this year will not be more than 60 per cent of the 1937 acreage which would make the 1938 acreage approximately 3900 to 4000 acres.

We have had especially favorable weather conditions during February and the first days of March. The stand of potatoes is generally good and the condition of the crop at the present time is probably a little ahead of normal, particularly in the extreme Southern end of the state. The seed potatoes shipped into the state are in better condition than in the past, since the Mississippi Department of Agriculture under the law has prevented shipping in of seed Irish potatoes other than certified seed stocks for the first time this season.

There is no serious effort being made to enter into any potato marketing agreement to control commercial shipments through the Agricultural Adjustment Administration. There will, however, be

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representatives from Mississippi attending a conference in Washington about the middle of March with the Agricultural Adjustment Administration to consider the possibilities of developing a marketing agreement on early Irish potatoes, but so far, the Mississippi growers have indicated no interest in such a proposal. (Mar. 9).—J. V. PACE.

NORTH CAROLINA

Potato plantings in our early section are practically completed. We have had a very good season for outdoor work and the planting operations were completed earlier than usual. We are expecting a twenty per cent decrease in potato acreage compared with last year. Most of our seed is obtained from Maine, and so far as I know it was all in good condition this year. We have very little locally grown certified seed in the mountainous section of the state. In fact, no Cobblers were certified and only a few Green Mountains.

Potato control is not being emphasized very much this year probably because of the voluntary reduction in acreage caused by the drastic prices of last year. (Mar. 5).—ROBERT SCHMIDT.

OREGON

This is not an early district and planting operations do not take place until after the first of May. Indications at the present, although rather preliminary, are that the acreage will only be slightly below the record acreage of last season when 20,559 acres were planted. Financial arrangements will be an important factor affecting acreage.

The growers in this district are particularly interested in a federal marketing agreement for the 1938 crop and more than likely arrangements will be undertaken in the near future to complete a set-up of this kind. Mr. Henry Semon, president of our association, is now in Washington, D. C. attending a meeting in connection with future marketing agreements. (Mar. 9).—C. A. HENDERSON.

VIRGINIA

In July, 1937, following the meeting of potato and vegetable delegates called by Secretary Wallace, and at which meeting the delegates approved potato and vegetable organization as a prerequisite to reorganizing and rehabilitating those industries, the Virginia growers met to develop organization plans.

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After several conferences, a decision was reached to organize our group through the American Farm Bureau Federation. It was believed that National work could be done perhaps more effectively in this way than simply by forming potato and vegetable organizations which would be entirely independent of any National organization.

Five or six of the eastern Virginia counties formed these organizations, with a membership ranging from seventeen hundred and two thousand members. A joint program was developed with North Carolina.

An effort was then made by the Carolina and Virginia growers to have potatoes included in the Farm Bill which was passed during the current session of Congress. This was not possible, since only two states were represented in the effort. This again showed the need of a general organization.

The Virginia growers decided not only to maintain their Farm Bureau allegiance, but also to form a potato and vegetable growers' association. This was done, and an appropriation of \$2,400.00 was secured from the trucking counties, and probably an appropriation of \$2,500.00 will be secured from the state.

The new organization felt that it had two problems in view: (1) to attempt the expansion of its own organization through similar organizations in other states, in order that a coordinated well-supported program could be developed for the long-time pull; and (2) what steps might be taken to offset the expected loss incurred on the white potato crop this season because of the available large supply.

It was the opinion that with the overly large supply of potatoes in sight, it was the part of wisdom to restrict the shipment of cull potatoes and other low-grade potatoes (both by grade and size) during the coming season. With this in view, a meeting has been called in Washington, beginning the 15th of March to consider a marketing agreement limited to the prohibition of cull shipments and restrictions on the shipment of other low-grade potatoes.

The general cry from the South is to make such an agreement simple, effective and secure through enforcement. Perhaps this is too much to expect, but I would question whether an agreement could be effected otherwise.

The planting on the Eastern Shore of Virginia will be perhaps 15 per cent less than last year's planting, or will approximate the acreage planted in 1936. The intentions were to reduce the acreage 10

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per cent, but I believe both Maryland and Virginia have reduced more, following the outlook meetings. However, plantings to the south of Virginia—California, Texas, and Oklahoma—had progressed too far to secure additional curtailment after the facts became known to the growers. (Mar. 7).—G. S. RALSTON.



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